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Microbial induced mineral precipitation and corrosion in geothermal plants

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The development of renewable energy sources such as geothermal energy is of increasing importance to secure a sustainable energy supply and a reduction of greenhouse gas emission to the atmosphere at the same time. For an efficient and permanent reliable use of geothermal energy the interruption of operation due to malfunction of the facility has to be prevented.
Up to now only a few studies focus on microbial induced processes that could influence the operational reliability of geothermal plants. A geothermally used groundwater system was investigated under microbial, geochemical, mineralogical and petrological aspects. The monitored groundwater system is located in the North German Basin, Germany. To characterize the microbial biocenosis of a seasonal heat storage fluid and filter samples were taken from regularly and shift as well as disturbed plant operation and analyzed based on 16S rDNA. Among fingerprinting methods (SSCP, DGGE) for the characterization of the microbial biocenosis, FISH will be applied for the quantification of microorganisms and the determination of their metabolic activity. The identification of microorganisms enables the correlation to metabolic classes and provides information about biochemical processes in the used groundwater system.
First results of analyses of the influence of the operational mode on the number of cells and the metabolic activity will be presented. Indicator organisms, which can be useful for an early detection of plant failures, will be identified, if possible.
Our goal is to enhance process understanding particularly related to scaling and corrosion processes of engineered geothermal systems to contribute to the optimization of plant reliability.
In addition see Lerm et al. EGU 2011.